



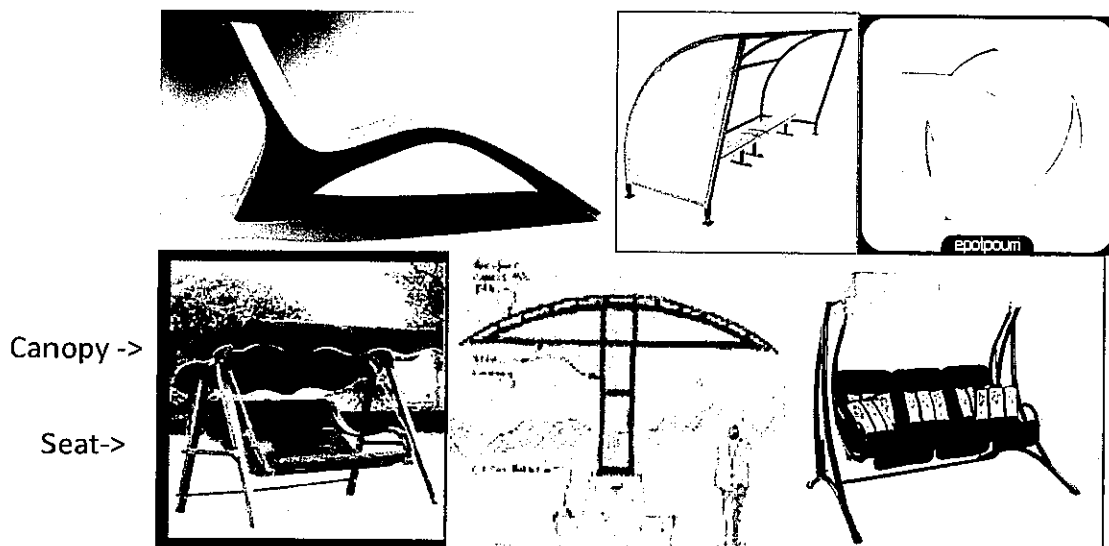
ASSESSMENT TASK

The water front bench

Subject:	Y10 Standard Mathematics	Name	Tasha Casberg
Topic:	Polynomials	(Class):	Y10 (P)
Date of task assigned:	22 nd September, 2011	Reading material:	Chapter 2 & 6 in Book A
Submission of task:	Please submit a print copy of the assessment to your Maths teacher on or before Thursday, 6 th October 2011 at 0840.	Due Date:	6 th October, 2011

This task assesses Criteria A, C, & D.

Task Brief: Design a water front bench with a canopy.



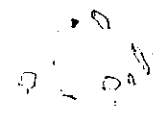
ADVICE:

Read the criteria descriptors and task-specific rubrics carefully before you start your work. This will give you a clear understanding of what is required and what a high quality piece of work for this task must include.

This way you give yourself the best chance of achieving the highest levels in this task.

Please attach this sheet to your final report.

AA 7
CA 3
D 2 3



The Task

Background

You have been hired as a new designer at the *Polynomial Seating Company (PSC)*. The company is world famous for designing and manufacturing creative and attractive seats and benches, mainly for outdoor use. The Manager is giving you a special task for a new client.

You are given the task of designing a chair/bench for use outdoors. The client wants your designs quite quickly. So does the manufacturing department of PSC, as they will want to start production quite soon.

The bench should be (a) comfortable, (b) suitable for keeping off the sun and the rain and (c) have a profile that is highly mathematical in shape – in fact it should use functions that you have met in this topic of Polynomials (i.e. quadratics).

Of course, you won't **build** the bench, but you will come up with the functions (equations) that will define the shape of the bench.

You will submit a report that outlines the development of your design. The report will be assessed using MYP Assessment Criteria A, C and D, and the paragraphs below expand on this.

Criterion A:

Here you show your **knowledge and understanding** of quadratic equations and their graphs. You **MUST** provide all the appropriate information about your design specification including:

- Accurate plots of all graphs, showing the important features of the design;
- Sets of equations describing all curves used and listing the range of x-values;
- The process (mathematics) by which you came up with the equations used in the design including possible modifications that could be made if requested by the client.

In order to score top marks in this criterion, you should show how you have used your knowledge in **unfamiliar situations** by embedding and developing at least one function that has not been covered in class, such as a cubic.

Criterion C:

Your design needs to be **communicated** effectively for your manager, the client, and the manufacturing department who will use it to make the actual bench. This means that all graphs will be clearly labeled, and all appropriate diagrams and charts will be explained. Equations will have to connect sensibly to appropriate units of distance.

Any software used will have to be cited and, if necessary, explained.

Criterion D:

Before you begin your design, it is important that you come up with a set of specifications so the client can see how comfortable, sheltered, and creative your design will be. You need to **reflect** (and possibly research) on associated real-life issues, such as:

- People's sizes and comfort levels;
- How people sit or lounge;
- How the sun and the rain act;
- How easily the bench might be stored away;
- Any other features that you believe may be relevant to the product.

Once you have finished your design, please **evaluate** it against the specifications you listed before you began. Consider how well your model fits your specifications by checking the degree of accuracy (possibly percentage error or sig. fig.). Because the client wants the initial design in just a few days, there may well be a number of things you cannot do. If you had more time, suggest what other things you might do to improve your product? What different mathematical methods might you have tried?

Assessment Criteria for Y10 Standard Maths Bench Assessment

Criterion A		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	The student generally makes appropriate selections of one or more simple functions (such as $y=mx+b$, $y=x^2$) and manipulates them in to form a chair/bench.	The student generally makes appropriate deductions when solving simple problems in familiar contexts.
3-4	The student generally makes appropriate selections of two or more non-linear functions (eg quadratics) and manipulates them to form a chair/bench.	The student generally makes appropriate deductions when solving more complex problems in familiar contexts.
5-6	The student generally makes appropriate and accurate selections of three or more functions (eg a mixture of linear and quadratic) and manipulates them to form a chair/bench with a canopy.	The student generally makes appropriate deductions when solving challenging problems in a variety of familiar contexts.
7-8	The student consistently makes appropriate and accurate selections of four or more functions, at least one of which is an unfamiliar one (eg cubics, exponential etc) to form a chair/bench with a canopy.	The student consistently makes appropriate deductions when solving challenging problems in a variety of contexts including unfamiliar situations .

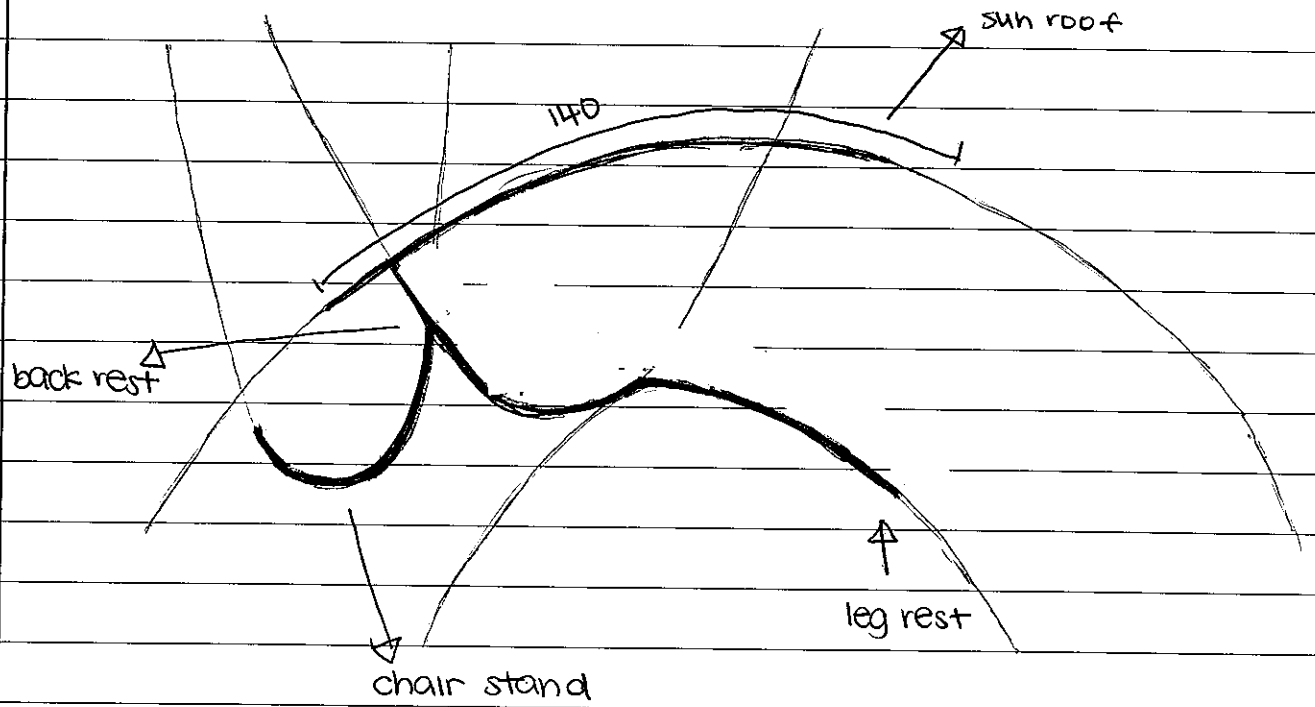
Criterion C		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Some very basic equations are offered and described. There are some appropriate diagrams and graphs. There is a basic narrative that describes the processes used.	The student shows basic use of mathematical language and/or forms of mathematical representation. The lines of reasoning are difficult to follow .
3-4	Equations used are generally clearly explained. Clear, accurate and relevant graphs, and/or charts and tables are provided. It is generally easy to see how these diagrams describe the development of the chair/bench design. Key vocabulary is used. Narrative is generally accurate.	The student shows sufficient use of mathematical language and forms of mathematical representation. The lines of reasoning are clear though not always logical or complete . The student moves between different forms of representation with some success .
5-6	Several graphs and diagrams are offered to show the development of the chair/bench. Graphs are accurate and detailed. Equations are provided which match the important features of the graphs. It would be possible for PSC engineers to produce the chair/bench from the diagrams. The narrative is very clear.	The student shows good use of mathematical language and forms of mathematical representation. The lines of reasoning are concise, logical and complete . The student moves effectively between different forms of representation.

Criterion D		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	There has been a limited amount of relevant research undertaken. To some degree, the student has connected this research to the design of the chair/bench.	The student attempts to explain whether his/her results make sense in the context of the problem. The student attempts to describe the importance of his or her findings in connection to real life where appropriate.
3-4	The student has undertaken good, relevant research and has used this in the development of the chair/bench. The student has explained with justification how the design features of the chair/bench relate to real-life issues. The student tries to explain the accuracy of the equations.	The student correctly but briefly explains whether his/her results make sense in the context of the problem. The student describes the importance of his/her findings in connection to real life where appropriate. The student attempts to justify the degree of accuracy of his/her results where appropriate.
5-6	The student critically compares the final product with features identified at the design stage. Real-life issues associated with the design are developed. The student justifies appropriateness and accuracy of all equations and offers a critical review of the mathematical methods used, suggesting viable alternatives or improvements where appropriate.	The student critically explains whether his or her results make sense in the context of the problem. The student provides a detailed explanation of the importance of his/her findings in connection to real life where appropriate. The student justifies the degree of accuracy of his/her results where appropriate. The student suggests improvements to his/her method when necessary.

10



Design



[illegible]

Move Graphics View
Drag the Graphics View or one axis (Shift + Drag)

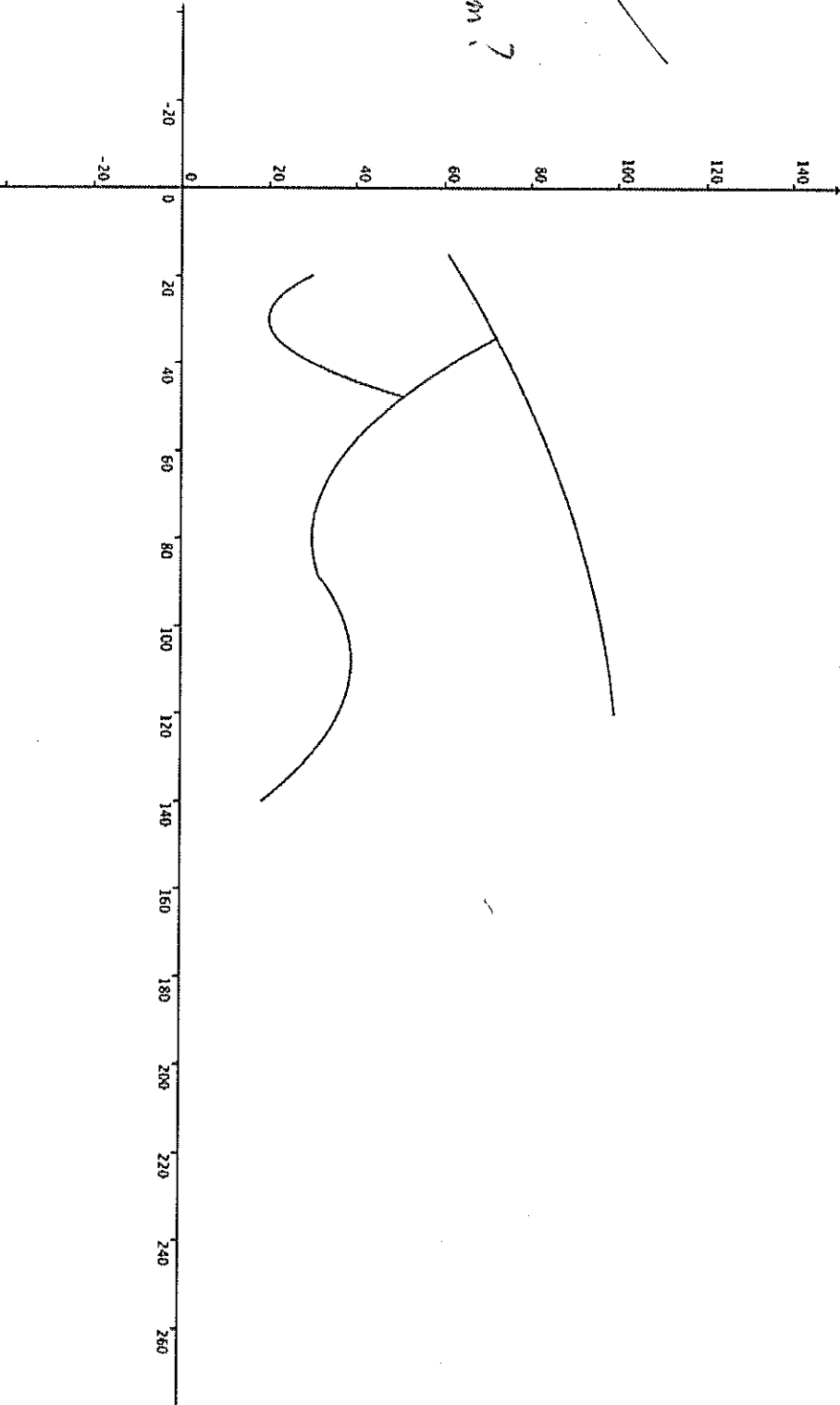
Free Objects

- ☐ $f(x) = -(x - 140)^2 / 400 + 100$
- ☐ $h(x) = (x - 80)^2 / 50 + 30$
- ☐ $q(x) = -(x - 108)^2 / 50 + 39$
- ☐ $r(x) = (x - 30)^2 / 10 + 20$

Dependent Objects

- ☐ $g(x) = -(x - 140)^2 / 400 + 100$
- ☐ $p(x) = (x - 80)^2 / 50 + 30$
- ☐ $s(x) = (x - 30)^2 / 10 + 20$
- ☐ $t(x) = -(x - 108)^2 / 50 + 39$

which lines are they?
how you generate them?



Input:

GeoGebra software interface showing various tool icons (compass, ruler, eraser, etc.) and a command input field at the bottom.

100



Images	- http://www.google.com/search?tbm=isch&hl=en&source=hp&q=deck+chairs&gbv=2&oq=deck+chairs&aq=f&aql=&gs_sm=e&gs_upl=2831365810137441171910101010101010
Images	- "Home - IKEA" welcome to IKEA.com - IKEA Inter - IKEA systems B.V. web. 28 sept. 2011 < http://www.ikea.com/hk/en >
web	- MaAdams, David. "English - GeoGebraWiki" Geogebra. 19 sept. 2011 web. 28 sept 2011 < http://www.geogebra.org/en/wiki/index.php/English >
web	- "Geogebra" Wikipedia. the Free Encyclopedia. 19 aug. 2011. web. 28 sept. 2011 < http://en.wikipedia.org/wiki/Geogebra >.
web	- learn and we use geogebra. web. 28 sept. 2011 < http://math247.pbworks.com/w/page/20517545/learn%20and%20use%20studio >.
How people sit/lounge	- studio, The Blog. "sitting is unhealthy (and what do I do about it.)" Mark's Daily Apple. web 03 oct. 2011 < http://www.marksdailyapple.com/sitting-unhealthy/ >.
sun	- "sun" Wikipedia, the free encyclopedia. web 03.2011 < http://en.wikipedia.org/wiki/sun >.
rain	- "rain" Wikipedia, the free encyclopedia. web 03.2011 < http://en.wikipedia.org/wiki/rain >.
software	- software used is Geogebra.

[illegible]



Miss. Luk's math class measurements :

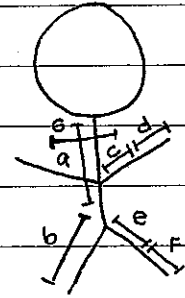
A - shoulder to hip E+ Hip to knee cap

B - hip to the floor F - knee cap to floor

C - shoulder to half arm G - shoulder to shoulder.

d - half arm to fingers

People's sizes :



A	50	B	103	C	30	D	48	E	54	F	50	G	45
	46		103		31		44		50		48		41
	49		94		35		24		45		47		40
	31		96		28		38		48		48		38
	32		108		30		45		58		50		40
	55		97		30		25		51		46		42
	47		85		17		26		54		31		42
	45		88		26		24		48		42		40
	77		110		30		40		50		57		50
	40		40		30		30		40		40		40
	43		93		31		44		56		49		46
	43		98		27		25		48		50		37
	40		102		28		25		51		51		44
Average : 46 93.61538462 28.69230769 33.69230769 50.23076923 46.84615385 41.92307692													

How people sit / lounge:

- when outside people usually sit on deck chairs to relax
- having a chair with back support reduces back problems
- people who feel relaxed are more comfortable.

sun/rain:

- using the wrong materials can affect a person's comfort.
- some materials make the seat hot
- the rain can soak up the material

reflection? analysis?

Evaluation:

The design that I have made most likely is for the average person to sit. There is a sun roof to keep the person in the shade. I think the overall design is very simple and always accessible.